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Ground-working implement with rotating tools

The ground-working implement is equipped with shields (8) at its two lateral ends. Each shield (8) can be pivoted toward the outside around a joint (11) that is equipped with a horizontal axis (21) that extends into the implements traveling direction. The resting position of each shield (8) will be maintained by means of a spring (25) that possesses a certain pretension, and that will be further stretched upon the deflection of said shield (8).

A second joint (12) is projected to be present in addition to said joint (11). And the horizontal axis of this further joint proceeds transversely to the implements traveling direction, and the shield (8) can be pivoted backwards around said additional joint (12) for the case that the shield (8) strikes against obstacles.

It will be achieved by means of the special arrangement of the first mentioned joint (11) that the shield maintains a parallel position to the implements traveling direction upon its lateral pivoting movements.

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Ground-working implement with rotating tools

The invention is concerned with a ground-working implement that possesses rotating tools that are suspended in a frame, specifically a rotor harrow with several tool disks transversely arranged to the implements traveling direction that are equipped with vertically oriented undulations, and with which a shield is positioned at both lateral ends of said frame that are oriented in a position that is parallel to the traveling direction of said implement, and with which each of said shields is suspended by means of two joints from said frame to allow for the pivoting into the sideward direction away from said frame, and with a second joint that is connected to the first joint that allows for the upward pivoting of said shield, and with which said second joint is located in the frontal area of said shield, and with which the axis of said joint proceeds in a traversal direction to the traveling direction of said implement.

Soil working implements with rotating tools can propel hard objects, specifically rocks, into a sideward direction. One attaches protective shields to that kind of equipment to avoid any hazards that might result from these actions, because the objects propelled away hit said shields, and are thus kept inside of the equipment enclosures. To avoid that the entire implement needs to be lifted upward upon the impact of said shield with an obstacle, for example, a large rock, said shields are very often suspended in such a manner that they can move away into the upward direction. Because of the fact that it could also be possible that rocks or similar objects could get jammed between said shields and the rotating tools, one suspended the shields in such a manner that they can move sideways once a certain reaction force is exceeded. The shields have the additional duty to prevent the sidewaysd ejection of dirt.

The axis of the first joint of a known implement of the above-mentioned kind (DE-OS 27 51 160) is arranged in a vertical direction and in the front section of the shield. Said shield has to move into a slanted direction in relation to the equipment traveling direction. In this position, the shield acts like a snowplow, which means, it possesses the tendency to move the soil toward the sides. This is undesired because of the fact that hills can be created on the handled ground.

The scope of the invention is to create a ground-working implement of the above mentioned kind in such a manner that the sideward pivoting of the shields will not result in a slanted position of said shields in relation to the implements traveling direction.

With n equipment that is designed in such a manner, the shield pivots in such a way, if forced by an obstacle, that the bottom edge of said shield will be moved away from the frame while maintaining its parallel direction to the traveling direction of the implement, and at the same time, said shield will be lifted upward some way, which occurs along a cylinder barrel that possesses an axis that correlated with the axis of the first joint.

Because of the fact that two joints are present with this arrangement, the suspension of said shield is sturdy and has a low wearing characteristic. Because of these facts, the wearing of the components of the shield suspension is very low even with a long time of use of the implement.

Herewith, it is advantageous if each shield can be adjusted in its height relative to the first joint (claim 2). Construction wise, it is easy to achieve such a height adjustment with the means that are stated in claim 3. With the support of the height adjustment it is possible to select an optimal shield position for any operation depth of the implement.

The second joint has the stated design that is displayed in figures 4 and 5, and that represents an advantageous execution example. The shields can easily be moved into the traveling position by means of a moveable joint bolt following claim 5. This movement could become necessary with such implements that have a width that is larger than the largest width that is allowed on public roads.

A simple connection between the two joints is achieved by such means that one probably attaches a fork to the moveable joint bolt of the second joint (claim 6). By means of positioning the axis of the second joint following the design that is explained in claim 7, one achieves relatively large distances between the bottom edge of the shield and the joints. This is of advantage for the movements of said shield. The positioning of said joint as far as possible to the front has the advantage that the shield will be lifted relatively high already even though the pivoting angle is relatively small.

It is of advantage to herewith project the presence of elastic resetting members following the claims 8 through 11. Herewith, it is possible to apply large but yielding forces onto the components that maintain the shields in their projected positions. However, herewith it can also be adequate to utilize weight forces for this purpose. Specifically for the pivoting around the second joint the resetting movement that is caused by the weight force is relatively large. However, it is also possible to create forces at both joints by means of a single spring following the arrangements that are explained in claim 10. A specifically space saving arrangement is achieved with the support of a wound up leg spring following claim 11.

A stop according to claim 12 for defining the horizontal position of said shields bears the advantage that these will not swing downwards during the lifting process.

The positioning of the first joint following claim 13 bears the advantage that the lifting motion during the sideward pivoting of said shield is minimal. For example, this is desired for those cases in which the shield has ground contact and should not lift off the ground if possible.

An execution example of the invention is displayed in the drawing. Shown here is in:

Fig. 1 a frontal view of a disk harrow,

Fig. 2 a side view according to the arrow II in Fig. 1,

Fig. 3 a detail of the shield suspension, and

Fig. 4 a shield suspension, with which one horizontal joint is moved further to the outside if compared with the execution examples of the Figs. 1 through 3.

The disk harrow that is displayed in the drawing possesses a frame 1 that is also designed to be the gearbox. Attached to the frame 1 are journals 2, 3, and a tower 4 for the connection of the implement with a three point hitch of a tractor. A drive shaft connector 5 that is utilized to drive the implement is located at the front side of the gearbox.

The disk harrow contains several tool disks 6 that are positioned in a row that is installed transversely to the traveling direction of the implement (in Fig. 2 indicated by means of the arrow F). The tool disks are equipped with tines 6a, 6b, and they can rotate around a vertical axis 7. To prevent the throwing of dirt that the disks 6 throw up to the sides, shields 8 are positioned at the sides of the implement. In order to avoid damages to said shields, said shields have to be able to move aside, for example, in those cases in which a large rock got trapped in the space 10 between the shield 8 and a neighboring disk 6, or if the bottom edge 8a has to move across a rock. To enable this moving away, a shield is suspended in the manner that is described in the following.

The shield suspension possesses a first joint that is identified by the number 111, as well as a second joint that is identified by the number 12. The second joint 12 possesses a bearing pedestal 13 that is equipped with a bearing bore 14. The bearing bore 14 is penetrated by a horizontal bolt 15, of which the geographic axis is indicated with the number 15a. The bolt 15 can be moved inside the bearing bore 14. In the displayed operation position, the moving position of the bolt 15 is fixed in position with the support of two traverse pins 16 and 17 that are placed through holes of said bolt 15 that are located at each side of the bearing pedestal 13. A further bore 18 is located in the bolt 15 that can be utilized for fixing a further panning position of the bolt 15, which allows to achieve such a position after moving the bolt 15 that the hole 18 is located outside of the bearing bore 14. Herewith, the traversal arranged locking pin that was previously placed in the hole 16 could now be placed into said hole 18.

A fork 19 is attached to the outermost end of the horizontal bolt 15, and said fork 19 is a part of the first joint 11. Suspended in the area between said fork is a block 20 in such a manner that it can rotate around a bolt 21 that has a geometrical axis that is identified with 21a. Solidly connected to the block 20 is a vertical carrier 22, to which the shield 8 is connected in a manner that can be adjusted in its height. Herewith, the height adjustment is possible in such a way that a vertical row of holes is positioned in the carrier 22, as well as in the shield 8. The positions of these holes are symbolized by means of the dash-dotted lines 23. The hole-distances in the carrier and the shield are the same, thus allowing for the components and their respective holes that they can overlap. Depending on which holes are caused to overlap, the level of height of the shield 8 and the carrier 22 will vary. The shield 8 is connected to the carrier 22 with the support of two bolts. It is also possible that the identical hole arrangements can be replaced with differentially applied holes that would allow for a very fine height adjustment.

A stop 24 is attached to the fork, and the carrier rests against said stop 24 during the standard operating position of the shield 8. The resting against that stop is maintained by means of the force of a spring 25. A further stop 25 is also attached to the fork, and said stop 25 rests against th upper side 1a of the gearbox if the shield 8 is in its normal

position. This resting against said stop is maintained by means of the weight force that is applied to the center of gravity S that is caused by the weight of said shield 8. This weight force creates a torque force around the second joint 12, which tries to rotate the shield in Fig. 2 in a clockwise direction.

A flap 26 into which the tension spring 25 is hooked is attached to the carrier 22. The other end of said tension spring 25 is engaged with a flap 27 that is welded to the horizontal bolt 15. With the displayed arrangement of said spring, this setup applies a torsion force around the first joint 11, which causes that the carrier 22 will be pulled against the stop 24.

Herewith, it is also possible that alternatively to the tension spring a wound leg spring 28 can be utilized following Fig. 3. The wound leg spring surrounds a joint bolt 21' that is identical to the joint bolt 21 following Figs. 1 and 2. The leg 28a of the spring 28 is applied to a pin 29 that passes through the joint bolt 21'. The other leg 28b is suspended at the fork 19. The wound leg spring is also able to apply a torsion force onto the carrier 22. For this purpose, the block 20 is connected to the bolt 21' by means of a traverse pin 30 in such manner that it is able to rotate.

The implement functions as described in the following. During the normal fieldwork, the shield 8 is positioned in the displayed working position. For the case that the shield has to pivot away because of an obstruction in the space 10, a pivoting takes place around the first joint 11, which causes tension to be applied to the spring 25. Once the obstacle has passed the area 10, the shield will be pulled back again into the working position by means of said spring 25, and the working position is reached once the carrier 22 butts against the stop 24. For the case that the shield 8 rides up onto an obstacle that is located in front of the implement, a lifting of the shield occurs by means of pivoting around the second joint 12. Once the obstacle is passed, the weight force causes the shield to move back into its normal position that is achieved as soon as the stop 25 rests against the topside 1a of the gearbox 1. It is also possible herewith that both pivoting motions can occur at the same time, which means, the shield can move to the side around the joint 11, as well as at the same time around the joint 12 into the upward direction.

The working depth of the implement is maintained with the support of a ground support 21 that designed in the form of a roller. This roller 31 can be height adjusted relative to the frame 1 in a manner that is not displayed here. In case that the height is changed, it might be required that the shield 8 also needs to be adjusted accordingly. This adjustment of the shield 8 can be executed by means of selecting the appropriate holes 23, and putting the relevant attachment bolts through said holes.

For the case that the implement is to be transported on public traffic ways, its width will be reduced in such a manner that the shields will be placed against the end sides of the frame 1. For this purpose, the transverse pin 16 will be pulled, and the horizontal bolt 15 will be moved inside the bearing hole toward the inside. Herewith, no tension will be applied to the spring 25, because of the fact that said spring is anchored directly to the suspension bolt. It is possible to utilize the pin 16 for securing the transport position in such a manner that it is pushed through the transverse hole 18 after the bolt 15 has been moved far enough that the transverse hole 18 is located outside of the bearing bore 14.

Herewith, it is also possible that a tension spring can be hooked into the frame 1 instead of the design that is displayed here, in which the spring 25 is attached to the bolt 15; and said spring could be in such a position that it also applies a force around the second joint 12. One would select such an arrangement for such cases in which the restoring moment is not enough due to weight forces that are not high enough.

The horizontal joint bolt that is identified with 21' of the execution example following Fig. 4 is moved further to the outside, if compared with the Figs. 1 and 3. It is located above the shield 8. This arrangement results in a somewhat different pivoting path of the side shield, which means, a pivoting path that is such that the distance to the ground of the shield upon its sideward pivoting movement will change less heavily than this is the case with the other execution examples.

1. The invention is concerned with a ground-working implement that possesses rotating tools that are suspended in a frame, specifically a rotor harrow with several tool disks transversely arranged to the implements traveling direction that are equipped with vertically oriented undulations, and with which a shield is positioned at both lateral ends of said frame that are oriented in a position that is parallel to the traveling direction of said implement, and with which each of said shields is suspended by means of two joints from said frame to allow for the pivoting into the sideward direction away from said frame, and with a second joint that is connected to the first joint that allows for the upward pivoting of said shield, and with which said second joint is located in the frontal area of said shield, and with which the axis of said joint proceeds in a traversal direction to the traveling direction of said implement, characterized in such a way that the axis (21a) of the first joint is positioned horizontally and parallel to the traveling direction of said implement.

2. A ground-working implement according to claim 1, characterized in such a way that each shield (8) can be height adjusted in relation to the first joint (11).

3. A ground-working implement according to claim 2, characterized in such a way that a carrier member (22) for the shield (8) is positioned at the first joint (11), to which the shield (8) is attached with the support of bolts that penetrate the shield (8) and carrier member (22), with which the carrier member (22), and/or in the shield (8) vertical hole rows are positioned, and with which said holes will overlap with each other once adjusted for the different height positions of the shield.

4. A ground-working implement according to one of the previous claims, characterized in such a way that the second joint (12) possesses a horizontal bolt or stud (15) that can be rotated in a bearing bore (14) that is located at the frame (1).

5. A ground-working implement according to claim 4, characterized in such a way that the horizontal bolt or stud (15) can also be moved laterally in the bearing bore (14), which means, from a resting position into a working position, in which the shield has a larger distance to the lateral side of the frame (1) than this is the case with the working position, with which it is also possible to lock said device in its working and its resting position, and into the working position, for example, with the support of two transverse pins (16, 17) that are located at the sides of the bearing bore and that penetrate through the bolt (15), and with which the resting position is determined also by means of a transverse pin that penetrates through the bolt (15) at another point, and that is also positioned at the side of the bearing bore.

6. A ground-working implement according to one of the claims 4 and 5, characterized in such a way that at the far most outer end of each horizontal bolt (15) a fork (19) is positioned as being a component of the first joint (11), in which a head (20) can be rotated that is directly or indirectly attached to the shield (8), for example, by means of a carrier member (22) following claim 3.

7. A ground-working implement according to one of the previous claims, characterized in such a way that the axis (15a) of the second joint (12) is located

outside of the frame (1), preferably in close proximity to the frontal end of the frame (1), or at the frontal end of said frame (1).

8. A ground-working implement according to one of the previous claims, characterized in such a way that an elastic resetting element (25) that is attached at the one side to the shield (8), or to components (22) that are connected with said shield (8), and on the other side to the second joint (12), or to the frame (1), and that applies a torsion force onto the first joint (11) that tries to move said shield (8) into the direction of the frame, and with which setup a stop (24) is projected to be present that is functional once the shield (8) is located in a horizontal position.

9. A ground-working implement according to claim 8, characterized in such a way that the elastic resetting element is a tension spring (25) that is applied on the one side to the shield (8), or to the shield carrier (22), and on the other side to the horizontal bolt (15) following claim 4.

10. A ground-working implement according to claim 8, characterized in such a way that the elastic resetting element is a tension spring (25) that is applied on the one side to the shield (8), or to the shield carrier (22), and on the other side to the frame (1), and that has a line of efficiency that proceeds in such a manner that a torsion force is also applied around the second joint (12) that tries to keep the shield (8) in the down position.

11. A ground-working implement according to claim 8, characterized in such a way that a joint bolt (21') that penetrates through the fork (19), following claim 6, and that is solidly attached to the head (20) that is engaged with said fork (19), is surrounded by a wound leg spring that has one of its legs (28a) attached to said bolt (21a), and its other leg (28b) is anchored to the fork (19).

12. A ground-working implement according to one of the previous claims, characterized in such a way that a stop for the limitation of the pivoting movement around the second joint is projected to be present, for example, a stopping plate (25) that is connected directly or indirectly with the horizontal bolt (15) following claim 4, and that rests in its normal position on top of the top side (1a) of the frame (1).

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European Search Report

European Patent Offic

Number of the Application
EP 82 11 0081

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Category	Characterization of the Document, including Information, as far as required, on the major components	Relates to claim	Classification of the application (int. Cl.4)
X	FR-A-2 402 391 (VAN DER LELY) * entire document *	1, 4 7a	A 01 B 33/12
X	DE—A-2 833 399 (AMAZONEN-WERKE H. DREYER) * entire document *	1, 8, 9	
A	FR-A-2 388 473 (VAN DER LELY)		
A	DE-A-2 388 473 (B. KRONE) * page 2, claim 7; figures 1 – 3 *		

Searched Trade Areas (Int. Cl.4)

A 01 B

The presented search report was produced for all patent claims

Searching Office	Ending Date of Search	Searcher
DEN HAAG	03/25/1990	VERDOODT S. J. M.

(19) Europäisches Patentamt
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(54) Improved adhesive tapes having a film backing of polypropylene or other olefinic polymer or copolymer and related manufacturing process.

(57) For pressure sensitive adhesive tapes having a film backing of polypropylene or other olefinic polymer or copolymer, the treatment of the non adhesive side before the release coat is applied causes the unwinding noise of the tape to be essentially reduced.

EP 0 096 841 A1

Low Noise

The present invention relates to pressure sensitive adhesvie tapes with a film support of olefinic polymer or copolymer capable of being unwound with low noise.

The pressure sensitive adhesive tapes having a film backing of polypropylene or other olefinic polymers or copolymers (either mono- or bi-oriented, or with balanced stretching, or coextruded, etc.) as manufactured with:

- adhesive compositions having elastomeric or plastomeric basis and applied by:

a) standard processes from solutions in organic solvents;

b) melt processes, better known as hot melt processes;

c) reacting processes;

- possible priming compositions, if deemed necessary;

- anti-adhesive layers (as applied to the opposite side with respect to that having the adhesive layer coated thereto), generally based on polyvinylcarbamate, polyvinylbehenate, etc. are unwound, especially if the unwinding operation is carried out at high speed, as it occurs in the cutting of bobbins for the manufacturing of rolls or in the application of the tape with automatic or semi-automatic or even manually operated equipments, with high noise levels, such as to give place to queries from the personnel attending to the tape cutting and applying operations, as well as of people casually present in the shop.

The reasons for which the noise level of tapes having film backings of polypropylene or other olefinic polymers is higher, the operating conditions being the same than that of tapes having a different type of support, such as for instance tapes having a film backing of polyvinyl chloride, have not yet been clarified.

It is through that these reasons can be attributed to:

a) the physical properties of the backing such as:

- thickness
- stiffness
- surface state (smooth, glazed, rough, etc.)

b) the properties depending on the surface energies of the backing such as:

- surface free energy
- critical surface tension
- friction static coefficients

c) the properties depending on the adhesive forming system, such as:

- tape adhesive value
- adhesive value to the backing
- unwinding force
- nature and composition of the adhesive
- nature and composition of the anti-adhesive layer.

Owing to economical reasons, film backings of increasingly reduced thickness are used, but there is possible to modify their stiffness by using block or random C_2C_3 copolymers as well as to modify the surface state of the backing by having recourse to coextruded films, the outer layer of which is modified by means of additives of suitable nature and physical state.

The structure and the chemical nature of the polymer forming the film backing are of undoubtable importance as regards the static coefficient of friction and the critical surface tension.

Illustrative examples are reported hereinafter:

Polymer	Static coefficient of friction	Critical surface tension (dynes/cm)
polyvinylidene chloride	0.90	40
polyvinylchloride	0.50	39
polypropylene	0.34	32
polyethylene	0.33	31
polyvinylfluoride	0.30	25
polytrifluoroethylene	0.30	22
polytetrafluoroethylene	0.04	18

The surface modification as induced by corona, flame, irradiating treatments, by changing the surface chemical structure of the film support, owing to the forming of polar compounds, to the strengthening of the surface layer resulting from the cross-linking and the anchoring of low molecuar weight polymeric fractions, to the increasing of the critical surface tension, may contribute to the occurrence of conditions suitable for increasing or reducing the noise level of the tape.

The properties strictly depending on the film adhesiving and releasing compositions, on

the adhesive nature and application system, on the rehological rehaviour of the adhesiv , on the adhesion specific values of the adhesive and on the unwinding force as regards the back side, relevantly influence the noise level of the tape.

Owing to the high noise level of adhesive tapes having a polypropylene film backing, their use is avoided in a number of application, although these films are notoriously more economical than PVC films and other used in the manufacturing of pressure sensitiv: adhesive tapes.

The main purpose of the present inventiun is that of providing a pressure sensitive adhesive tape having a film backing of polypropylene or other olefinic polymer or copolymer which shows low unwinding noise.

It has been found and is the subject of the present invention that the above purpose is achieved by means of a pressure sensitive adhesive tape of the type comprising a film backing or support of polypropylene or other olefinic polymer or copolymer, said backing being coated on the adhesive side, after a suitable treatment to bring the critical tension to a value of the order of 40dynes/cm, with a primer layer and with an adhesive layer, and furthermore having the non adhesive side coated with a releasing layer, characterized in that said non adhesive side, before said releasing layer is applied, is treated so as to bring the critical surface tension to a value of at least 33 dynes/cm.

As a matter of fact, it has been found that it is thus possible, in a fully surprising manner, to reduce the noise to values exceedingly lower than those tolerable or admitted by law.

As regards the treatment to be carried out on the non adhesive or back side of the adhesive tape in order to bring the critical surface tension to values equal or higher than the afore said threshold, it may be every one of the processes known and used for such a purpose, like the treatment by electric discharge with corona effect, the flame treatment, the irradiation etc.

The treatment according to the invention has been carried out with respect to pressure sensitive adhesvie tapes having a support of polypropylene film of 30 micron thickness, in which the side to be made adhesive had been treated so as to bring the critical surface tension to a value of 40 dynes/cm and coated with an anchoring layer of elastomeric primer (1 to 4 g/sq.m.) and with an elastomeric adhesive (24 g/sq.m.).

The side opposite to the adhesive one was treated so as to bring the critical surface tension to 35 dynes/sq.cm., whereafter a release layer was applied.

Adhesive tapes manufactured according to the standard technology, known in the related art, on the basis of the aforesaid characteristics, the specific properties were evaluated, and it was found that the adhesion force with respect to steel varied between 220 and 240 g/cm. that related to the back side varied between 120 and 190 g/cm, the low speed unwinding force was of between 130 and 170 g/cm and lastly that the noise index decreased to values of between 30 and 50, referred to an identical adhesive tape except that the non adhesive side had not been subejcted to the afore said treatment.

Like results were obtained when the critical surface tension of the back side was brought to values of about 38 dynes/cm before applying the release layer.

In the preceeding specification reference was made to adhesive tapes having a polypropylene film backing, but it is to be understood that the invention does hold true as well for film backings formed by other olefinic polymers and copolymers.

CLAIMS:

1. Adhesive tape with reduced unwinding noise of the type comprising a film backing of polypropilene or other olefinic polymer or copolymers, the adhering surface of said backing being coated with a primer and an adhesive layer, and being further coated on the back or non adhesive surface with a release layer, characterized in that the back side of said film below said release coat has a surface tension not lower than 33 dynes/cm.

2. A process for the manufacturing of an adhesive tape according to claim 1, characterized in that the back surface of said film backing is treated so as to bring the critical tension of the back surface of said backing to a value of at least 33 dynes/cm before said release coat is applied.

3. A process according to claim 2, characterized in that said treatment of the back surface is carried out by means of a flame treatment or of an electric discharge with a corona effect.

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 83 10 5621

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	GB-A-2 020 198 (MINNESOTA MINING) * Page 3, example 2, lines 83-98 *	1-3	C 09 J 7/02
X	DE-A-1 937 222 (ICI) * Page 5, line 9 - page 6, line 2 *	1-3	
X	FR-A-2 489 352 (MANULI AUTOADESIVI) * Page 7, claim 1; page 4, lines 18-20 *	1-3	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

C 09 J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12-09-1983	GIRARD Y.A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503 03.82

004533594
WPI Acc No: 1986-036938/ 198606
Piezoelectric relay using flexure drive element - acts on pivoted spring blade carrying movable contact cooperating with spaced fixed contacts
Patent Assignee: SIEMENS AG (SIEI)
Inventor: LUNEBURGER K
Number of Countries: 005 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
EP 170172	A	19860205	EP 85109068	A	19850719	198606 B
EP 170172	B	19890517				198920
DE 3570318	G	19890622				198926

Priority Applications (No Type Date): DE 3427266 A 19840724
Cited Patents: CH 261495; GB 2113474; US 2471967; US 2835761; US 3292111; US 4383195
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 170172	A	G	14		

Designated States (Regional): CH DE FR GB LI

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 170172	B	G			

Designated States (Regional): CH DE FR GB LI

Abstract (Basic): EP 170172 B

The relay uses a piezoelectric flexure transducer (1) as the drive element acting on a pivoted contact spring (3) carrying the movable contact at its free end. The contact spring (3) is pivoted at a point which is spaced from the point of contact of the drive element. A relatively small deflection of the latter is converted into a relatively large deflection of the spring (3).

The contact spring bearing point (4) may lie within the plane of symmetry between the two end positions of the flexure transducer (1), or may be offset from this plane.

ADVANTAGE - Simple compact construction. (14pp Dwg.No.1/7)

Abstract (Equivalent): EP 170172 B

Piezoelectric relay having a bending transducer (1) clamped at one end, by means of the free end of which at least one contact element (13) can be actuated, which element is constructed as leaf spring arranged approximately parallel to the bending transducer (1), which spring is connected to the free end of the bending transducer (1) and faces at least one counter-contact element with its free end in the region of the clamping location (1a) of the bending transducer (1), the leaf spring (13) being capable of swivelling about a bearing point (4;4a;8;14) which with reference to the point of action (6;16) of the bending transducer (1) is displaced in its longitudinal direction to a small extent by comparison with its total length, a tilting device with a spring element (27) acting on the leaf spring (13) also being provided, which device tends to swivel the leaf spring (13) from the position parallel to the bending transducer (1), characterised in that the spring elem nt (27) of the tilting device acts directly on the bearing point of the leaf spring (13) in its longitudinal direction.